

**[DESCRIPTION]****[Invention Title]**

A BAND DEVICE OF JOINING PIPE FOR PREVENTING FROM

5 **LEAKAGE**

**[Technical Field]**

The present invention relates, in general, to pipe joints to couple pipes to each other and, more particularly, to a pipe joint which joins pipes, such as 10 branch pipes and drain pipes provided in a lower portion of a manhole, and provides a superior seal after joining the pipes, thus preventing water from leaking at a junction of the joined pipes, and which can easily join pipes even though the pipes are different diameters.

15 **[Background Art]**

Generally, manholes to drain rainwater and sewage have pipe joining structures in which pipes 1, such as branch pipes, provided in a lower portion of the manhole, and drain pipes coupled to the branch pipes, are coupled to 20 each other. Typically, pipe joints are used at junctions between the pipes 1, such as the branch pipes and the drain pipes of the manholes, to prevent water from leaking. The above-mentioned pipe joints can be adapted to join pipes 1

of various diameters.

A representative example of conventional pipe joints will be described herein below with reference to FIG. 1 showing its general construction. A conventional pipe joint 5 includes a main body 2 which has at an inner surface thereof a cushion unit 5 made of rubber. The pipe joint further includes coupling parts 3 which have bent shapes and are coupled at both ends of the main body 2 by welding. The pipe joint further includes an extension part 4 which 10 is provided on one end of the main body 2 while extending from the coupling part 3.

As shown in FIG. 2, the conventional pipe joint having the above-mentioned construction is mounted around a junction of pipes 1. In detail, the coupling parts 3 are 15 coupled to each other by locking bolts 6 and locking nuts 7. The extension part 4 of the main body 2 is inserted between an end of the cushion unit 11 and the opposite end of the main body 2, thus being in close contact together into a stacked shape. By the above-mentioned coupling 20 method, even though the pipes 1 have various diameters, the pipe joint can join the pipes 1 within a range capable of overlapping the extension part 4 and the opposite end of the main body 2.

However, in the case that two pipes 1, in which one 25 pipe 1 is inserted into the other pipe 1, are joined using the conventional pipe joint, a gap undesirably occurs

between an inner surface of the main body 2 of the pipe joint and an outer surface of the small pipe 1. In other words, because the main body 2 of the conventional pipe joint has a cylindrical shape having a constant diameter, 5 although the cushion unit 5 provided inside the main body 2 has superior elasticity, it is very difficult to firmly seal the junction between the two pipes 1 coupled to each other to be stepped.

Furthermore, if the extension part 4 of the main body 10 2 is inserted too far between the opposite end of the main body 2 and the end of the cushion unit 5, a part of the cushion unit 5 may detach from the inner surface of the main body 2. Thus, the detached part of the cushion unit 5 may undesirably fold two or three times. In this case, gaps 15 are caused in the detached part of the cushion unit 5. Water leakage may occur at such gaps.

In addition, because an area of a part of each coupling part 3, welded with the main body 2, is narrow, when the coupling parts 3 are coupled to each other by the 20 locking bolts 6 and the locking nuts 7, the welded parts of the coupling parts 3 may break. Alternatively, the coupling parts 3 do not withstand the resistance of the main body 2 and, thereby, a gap between them may get wider.

**[Disclosure]**

25 **[Technical Problem]**

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a pipe joint which can be easily adapted to join pipes of various diameters, and in which even though a junction between the pipes is stepped, the junction is efficiently sealed, thus ensuring water tightness at the junction of the pipes.

Another object of the present invention is to provide a pipe joint in which a body part and coupling parts are configured as an integrated plate or the coupling parts are integrally coupled to the body part, thus providing superior durability, and increasing the productivity due to an improvement in a manufacturing process.

15 **[Description of Drawings]**

FIG. 1 is an exploded perspective view of a conventional pipe joint;

FIG. 2 is a sectional view to show the operation of the conventional pipe joint;

20 FIG. 3 is an exploded perspective view of a pipe joint, according to a first embodiment of the present invention;

FIG. 4 is a sectional view of the operation of the pipe joint of the first embodiment of the present invention;

FIG. 5 is an exploded perspective view of a pipe joint, according to a second embodiment of the present invention;

5 FIG. 6 is a latitudinal sectional view to show the operation of the pipe joint according to the second embodiment of the present invention;

FIG. 7 is a longitudinal sectional view to show the operation of the pipe joint according to the second embodiment of the present invention; and

10 FIG. 8 is a perspective view showing a reinforcing unit of the pipe joint according to the second embodiment of the present invention.

#### **[Best Mode]**

In order to accomplish the above object, a pipe joint 15 of the present invention is characterized in that both ends of a body part, to which coupling parts having bent shapes are integrally provided, are coupled by a locking means, and a reinforcing unit, which is gradually reduced in thickness from a center to both ends thereof, is provided.

20 In particular, the body part has a cylindrical shape. The body part may have constant inner and outer diameters at upper and lower parts thereof. Alternatively, the body part may be stepped around a predetermined portion thereof so that upper and lower parts differ in inner and outer 25 diameters. Thus, the pipe joint can be adapted to join

pipes of various diameters and, as well, it can easily join pipes having different diameters.

Furthermore, in the pipe joint of the present invention, a sealing unit is provided inside each of the body part and the reinforcing unit to prevent water leakage from occurring at a junction between pipes. As well, the sealing unit includes a close contact means to increase a contact force at a contact surface being in close contact with the body part.

Hereinafter, the construction of the pipe joint of the present invention will be described in detail, with reference to the accompanying drawings.

As shown in FIGS. 3 through 7, the pipe joint of the present invention can be embodied in various shapes according to a shape of a body part 10, 10a of which upper and lower parts are constant or different in inner and outer diameters.

The pipe joint according to each of the embodiments of the present invention includes the body part 10, 10a which is provided by rolling a planar material into a predetermined curvature. The pipe joint further includes coupling parts 20, 20a which are integrated with the body part 10, 10a. A plurality of locking holes 21, 21a is provided on the coupling part 20, 20a. The pipe joint further includes a locking means 30, 30a to couple the coupling parts 20, 20a to each other, and a reinforcing

unit 40, 40a which is in close contact with an inner surface of the body part 10, 10a while joining pipes 1.

The body part 10, 10a is made of an elastic metal or a synthetic resin having high hardness. Due to the above-mentioned special shape of the body part 10, 10a in which a planar material having a predetermined width is rolled, pipes 1 of various diameters can be joined.

As shown in FIGS. 5 through 7, in the case of the body part 10a of the present invention having upper and lower parts differing in inner and outer diameters, a stepped part 12a protrudes inwards and outwards. In this case, separate coupling parts 20a each having a bending part 22a are provided, unlike the body part 10 having the constant inner and outer diameter in which the coupling parts 20 are formed by being bent at both ends of the planar material constituting the body part 10. The coupling parts 20 are integrated with the body part 10a by a coupling method, such as welding. The bending part 22a of each of the coupling parts 20a has a width (approximately 100mm or more) greater than that of conventional arts. The bending part 22a is curved into the same curvature as that of the body part 10a to ensure stability while being attached to the body part 10a. In addition, stepped parts 23a and 44a are respectively provided on each coupling part 20a and the reinforcing unit 40a in the same manner as that described for the stepped part 12a of the body part 10a.

Due to the stepped parts 12a, 23a and 44a, the pipe joint of the present invention can simply join pipes 1 having different diameters. Even when a pipe 1 is inserted into another pipe 1, the water tightness of the pipes 1 is reliably maintained.

In the above-mentioned embodiments of the present invention, the sealing units 11, 11a, 41, 41a, which are made of a rubber or a synthetic resin, such as polyethylene (PE), are provided inside the body part 10, 10a and the reinforcing unit 40, 40a to provide the sealing effect. Furthermore, as shown in FIGS. 4 and 6, a plurality of close contact means 50, 50a each having a groove shape is formed on a surface of the sealing unit 11, 11a, which is in close contact with the inner surface of the body part 10, 10a, to be spaced apart from each other at regular intervals. The close contact means 50, 50a increases a contact force at a contact surface between the reinforcing unit 40, 40a and the body part 10, 10a and serves as a cushion material between the outer surfaces of the pipes 1 and the inner surface of the body part 10, 10a. In the meantime, in the embodiment in which the body part 10 has constant inner and outer diameter, upper and lower parts of the sealing material 11 may differ in thickness. Then, this pipe joint can execute the same role as that of the embodiment in which the upper and lower parts of the body part 10a differ in inner and outer diameters from each

other.

As shown in FIGS. 3 through 8, the reinforcing unit 40, 40a of the present invention is gradually reduced in thickness from the center to both ends thereof. Furthermore, the reinforcing unit 40, 40a is made of a metal or a synthetic resin having a predetermined hardness to be curved into the same curvature as that of the body part 10a. The reinforcing unit 40, 40a having the above-mentioned structure is in close contact with the inner surface of the body part 10, 10a to reinforce the sealing effect at the coupling parts 20, 20a. Additionally, the reinforcing unit 40, 40a further includes a stop means 42, 42a having a stepped shape. When the reinforcing unit 40, 40a is mounted to the body part 10, 10a, a lower end of the body part 10, 10a is stopped by the stop means 42, 42a. As such, the stop means 42, 42a serves to help longitudinally position the reinforcing unit 40, 40a. Preferably, a positioning means 43, 43a having a stepped shape and a role as a basic line is longitudinally provided on an outer surface of the reinforcing unit 40, 40a. Thus, the positioning means 43, 43a serves to help horizontally position the reinforcing unit 40, 40a which is mounted to the body part 10, 10a.

The body part 10, 10a of the pipe joint of the present invention is firmly mounted around a junction between the pipes 1 by the locking means 30, 30a, such as a

locking bolt 31, 31a and a locking nut 32, 32a, which is tightened into each of the locking holes 21, 21a of the coupling parts 20, 20a. Preferably, the locking holes 21, 21a of at least one side of the opposite coupling parts 20, 20a are defined into angled shapes, such as rectangular or hexagonal shapes. The locking nuts 32, 32a of the locking means 30, 30a are also angled to correspond to the angled locking holes 21, 21a, thus easily tightening of the locking means 30, 30a into the locking holes 21, 21a.

The operation of the pipe joint of the present invention will be described herein below.

The pipe joint of the present invention can easily solve problems, such as water leakage, occurring due to a difference in diameter between two pipes 1 when the two pipes 1 are coupled to each other such that one is inserted into the other. First, the body part 10, 10a is placed around the junction of the pipes 1. The body part 10, 10a, the reinforcing unit 40, 40a, or the sealing units 11, 41, 11a and 41a, which are respectively provided inside the body part 10, 10a and the reinforcing unit 40, 40a, surround the outer surface of the junction of the pipes 1 to be in close contact with each other.

In a detailed description, the reinforcing unit 40, 40a is positioned at a predetermined position around the coupling parts 20, 20a of the body part 10, 10a, which surrounds the junction of the pipes 1, by using the stop

means 40, 40a and the positioning means 42, 42a. In the above state, the locking means 30, 30a is tightened into each of the locking holes 21, 21a of the coupling parts 20, 20a. Then, the body part 10, 10a come into close contact with the outer surface of the pipes 1 while a gap between the coupling parts 10, 10a becomes narrowed. At this time, the sealing unit 11, 41, 11a and 41a, which are provided inside the body part 10, 10a and the reinforcing unit 40, 40a, are compressed between the outer surface of the pipes 1 and the inner surfaces of the body part 10, 10a and the reinforcing unit 40, 40a, respectively. As well, the desired contact force is maintained at the body part 10, 10a and the reinforcing unit 40, 40a by the close contact means 50, 50a provided in each of the sealing means 11, 41, 11a and 41a,.

Here, in the embodiment in which the upper and lower parts of the body part 10a differ in inner and outer diameters, the bending part 22a of each of the coupling parts 20a has a sufficiently wide contact area. Therefore, even if the locking means 40, 40a are strongly tightened, the coupling of the coupling part 20a to the body part 10a is stably maintained, thus ensuring the durability of the pipe joint.

Furthermore, due to the special structure in which the reinforcing unit 40, 40a and the body part 10, 10a overlap each other around the coupling part 20, 20a, the

pipe joint of the present invention can be adapted to pipes 1 having diameters larger than the body part 10, 10a and, as well, it can prevent water leakage from occurring at a junction between the pipes.

5           Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the 10 invention as disclosed in the accompanying claims.

#### **[Industrial Applicability]**

As described above, the present invention provides a pipe joint which joins pipes, such as branch pipes and drain pipes in a manhole, and by which pipes having various 15 diameters as well as pipes having different diameters can be easily joined, thus reducing the time required for joining pipes. Particular, even when the pipes are joined into a stepped shape, a gap between the pipe joint and the pipes is firmly sealed, thus preventing water from leaking.

20           In addition, in the pipe joint of the present invention, a body part and coupling parts comprise an integrated plate or the coupling parts are integrally coupled to the body part. Therefore, the durability of the product is improved and, as well, the productivity of the 25 pipe joint is increased by an improvement in a

manufacturing process. As such, the pipe joint of the present invention greatly affects both producers and consumers due to its economic efficiency.